Technology education and national development

Technologyeducationhas been defined as a continuous process of special education and training imparted in individuals for them to achieve socio-economic independence. One major essence of technology education is self-sustenance and social development. This paper takes a cursory look at the factors germane to functional technology education and its implications for national development, by examining the concepts of technology education, national development, infrastructure andgoalsof technology education.

The paper goes further to asses the development status of Nigeria, the relevant of infrastructure in the provision of viable technology education and some areas along policies, practices, attitudes, and sensitization of the public towards imbibing technology education that can foster national development. Introduction The basis of Nigeria'sphilosophy of educationis the integration of the individual into a sound and effective citizen, such a philosophy as articulated in the National Policy on Education (Federal Republic of Nigeria, 2004).

The goal of national development is hardly realizable without technology, which serves as a vehicle for the acquisition of appropriate knowledge, skills, abilities and competencies of both mental and physical nature. This is equipment for the individual to live in his society, and to acquire a relevant and balanced knowledge of facts about local and world phenomena. The etymology of technology is from Greek word ' tekhne', which refers to an art or craft, and ' logia' which means area of study. Simply defined, technology is ascienceof crafting.

Collins English Dictionary (2005, pg. 1675) defines technology as the application of practical or mechanical sciences to industry or commerce, the

methods, theory and practices governing such application and the total knowledge and skills available to any human society. Education, as defined by Adesina, Fagbamiye and Talabi (1985) is a tool for the integration of the individuals effectively into a society to enable them achieve self social, economic, political, scientific, cultural andtechnological progress.

Now, in the era ofglobalization, the growing importance of trans-border education provisions particularly, in the area of technology is quite understandable. Generally, stakeholders are anxious to see that educational institutions deliver what they should deliver and that what they deliver produces desirable outcomes. These desirable outcomes include, among others, changes in structures, attitudes and institutions as well as the acceleration of economic growth, the reduction of inequality and eradication of absolutepoverty.

Consequently, in addressing the issue of national development vis-a-vis technology education, it is of immense necessity to show the understanding of the phenomenon development and also to harness the indices of development before we can decide what we look out for in a developed, under-developed, developing nation and so on. The Concept of Technology Education According to Adeogun (2004), Ogunranti (1988) and Ukeje (1991), technology is the application of science and scientific knowledge to make the world more efficient using industrial methods.

Technology can also be viewed as the sum of the ways in which a social group provides for themselves with the materials of civilization, thusscience and technologygo hand-in-hand. It could be considered permissible then to say that technology is a systematic approach in an integrated process to

achieve practical purpose or achieve an end product. Hence, technology involves a practical engagement, that is, the act of doing, which is meant to solve human problems scientifically and systematically. Translated from its Latin root, ' educo' or ' educare', the word education means ' to lead'. In other words, education implies showing the way.

In principle, education is the process by which a person or group of persons lead in the act of acquiring new knowledge or experience. Ajelabi (2000) views education as implying the experience that a person gets in contact with or which one undergoes with or without the school. According to Collins Dictionary (2005, pg. 433), education is the act or process of imparting knowledge, especially at school, college or university, the art or process of acquiring knowledge, the knowledge or training acquired by this process, the theory of teaching and learning; or a particular kind of special directives (instructions) or training.

From the foregoing, an operational definition of technology education required for this paper projects technology education as a continuous process of special education, training and directives imparted in individuals for the development of innovative ideas to ensure socio-economic independence. It could be argued that the type of education which Nigeria pupils and students are exposed to at different levels of education in the school system today cannot favour the accomplishment of the Millennium Development Goals.

This can be substantiated with the concern about quality which is uppermost in any educational discourse all over the world, and Nigeria in particular. The United Nations Education Scientific and Cultural Organization (1999)

observes that quality in education is a multi-dimensional concept which should embrace " all functions and activities: teaching, academicprogrammes, research andscholarship, staffing, students, buildings, facilities, equipment, services to the community and academicenvironment".

To show that one is educated means that all aspects of his/her life is transformed to influence and be influenced by self, physical, social, political, economical and spiritual environments. For this reason, technology education should focus on productive skills that are saleable to the world, thus making such a country a power to associate with. The Concept of National Development National development is rooted in a force of change than can raise expectations, through sustainable and broad-based economic growth.

It could also be perceived as the totality of all activities within a nation whose main goal is to raise the living standards and general well being of the people. Collins English Dictionary (2005, pg. 443) defines development as the act or process of growing or developing or the product of developing. The Cambridge International Dictionary of English (1996, pg 377) defines development as growing or becoming more advanced or a recent important event which is the latest in a series of related events.

For the purpose of this paper, national development means the satisfaction and sustenance of the social, political and economic needs of the people of a state (nation). It could also be thought of as planned activities which focus on increasing and enlarging the capacities so that they can successfully handle greater positions in a nation. National development usually focuses

on improving the conceptual skills – the intellectual and abilities needed to handle complex situations and do a better job.

With economic needs, a change in the economic and social super-structure of the society is guaranteed. It is an improvement in the techniques of production in the consumption choices open to the average citizen, in thehealthof the citizen, in the behaviour of citizen and so on. It involves both quantitative and non-quantitative aspects. Also, it involves reduction in income inequality, unemployment and poverty (Adeogun, 2003).

Bannock (1977) opines that economic development is related to the process of growth in total and per capita income of developing nations accompanied by fundamental changes in the structures of their economies. Accordingly, these changes generally consist of the increasing importance of industrial, as opposed to agricultural, activity, reduction of dependence on imports from the more advanced producer and consumer goods, and dependence on agricultural or mineral products as main exports, and a diminishing reliance on aids from other countries.

Accompanying this economic process are attendant political and socio-cultural reforms aimed at resolving such problems as cultural deprivation, ignorance, political instability and poverty. Thus, national development can be perceived as the totality of all the activities within a nation whose main goal is to raise the living standards and general well-being of the people. The Concept of Infrastructure According to Coombs (1991), the educational system is a function of the quality and quantity of inputs. Of significance are the buildings, equipment and space.

This view gains the endorsement of Ejiogu (1984) and Nwagwu (1983) who note that of the four important factors in an attempt to balance the qualitative and quantitative growth of any educational system is the quality and number of infrastructure in the form of buildings, machinery and equipment; their maximal usage and proper maintenancecultureof the students, staff and community members that use such facilities. Infrastructure, as stated by Ehiametalor (2001) are the operational inputs of every instructional programme and they constitute elements that are necessary for teaching and learning.

Such include buildings, laboratories, machinery, furniture and electrical fixtures. In specific terms, Bosah (1997) opines that infrastructure represent the empirical relevance of the totality of the school environment for the realization of the school business. He identifies the following as components of infrastructure: landscape, playgrounds, buildings – classrooms, library, laboratory blocks, health blocks, toilets, hostels, administrative blocks and so on; utilities such as electricity, pipe-borne water and security facilities – walls (fences), gates, telephone and alarm system.

From the above, infrastructure can be considered the basic systems and services that are necessary for an organization, for example, buildings, transport, water and power supplies and administrative systems. These are things that represent the aesthetic picture of the school conveyed by the position of structures in relation to one another. Goals of Technology Education The goals of technology education include: -understanding the principles and dynamics of technology; understanding the principles of tool construction, processes of technology and modes of dissemination; -

developing intellectual processes of technology and their relation with other systems such ascommunication, economics, science, industry and society; -acquiring skills such as instrumentation production, maintenance, creativity, designing and communication; -mastering of technology-oriented forms of general and specific problem-solving; -producing technologically literate people; and -producing products that are employable and equally those who would proceed to higher education (Busari, 2004).

It is important to appreciate the interpretation of these goals in the policies and practices of technologyeducation in Nigeria. The policy guidelines set by the government for achieving the objectives are provision of basic tools for educational advancement including preparation for crafts of the locality, provision of curricular activities like teaching of science, local crafts, domestic science and agriculture, and provision of qualified teachers to handle technology education subjects. An Assessment of the Development Status of Nigeria In assessing the indices, criteria or factors responsible for the lassification of any country as being either developing or developed, it becomes imperative to understand the underlying key concepts: development, developing, under-developed, least developed, third world or fourth world and developed countries. Development can be regarded as the process of improving human welfare. Hence, the goals of development include: -balanced healthful diet; -adequate medical care; -labour opportunities commensurate with individual talents; -environmental sanitation and disease control; -sufficient educational opportunities; -reduced infant mortality; -decent housing; social and political participation promotingequality(United Nations, 2003). Developing countries are

characterized by high rate debts, low level of Gross Domestic Product (GDP), low standard of living, low level of productivity and low level of health, low level of investment; high dependency on the agriculture production and high vulnerability for external shocks. Least Developed Countries (LDC) generally suffer conditions of extreme poverty, ongoing and widespread conflict (includingcivil waror ethnic clashes), extensive political corruption and lack of political and social stability.

The form of government in such countries is often authoritarian in nature, and may comprise dictatorship, warlordism or a kleptocrazy (United Nations, 2003). The Relevance of Infrastructure in the Provision of Viable Technology Education With the present scope of technology in Nigerian classrooms, there are few technical schools and few universities where technology education is made available. It is lamentably sad to observe that the available infrastructure in the available technical colleges and universities of technology is inadequate when compared with the expected functions of such institutions of learning.

No doubt that infrastructure comprises things that are used directly or indirectly for the purposes of supporting, facilitating, influencing or encouraging transmission or acquisition of knowledge, competencies, skills and know-how. When we think of the poor state of this infrastructure, a question tends to come to mind – is the government actually interested in building this nation? This is just that there appears to be a gap between the policy statements and policy implementation.

Lending credence to this is Busari (2004) who observes that institutions (technical colleges, universities, etc) where technology education is run are

given little or lip support because they are viewed as any other education programme providers. The lackadaisical attitude of related agencies responsible for the functionalism of technology education is evidenced by the fact that the required infrastructure that would make technology education operational are either inadequate or non-existing. If technology education would facilitate national development, the quality of the manpower available for the performance of such tasks will dictate.

As reported by Subair (2004), even the universities of technology experienced a face-lift just because of the accreditation exercise embarked upon by the National Universities Commission (NUC), a body established by the Federal Government in 1962 for the purpose of quality university education. He opines that experiences of the students are better expressed when adequate provision of required infrastructure is made with due consideration for some factors such as students' population, student-teacherratio, minimum studio stage per student, drawing boards per student, etc and student work experience practice in particular.

The country is now faced with the stark realities of her poor technological base, which manifests in all fronts, ranging from poor economy, inability to properly maintain facilities inherited from colonial masters, to bad educational planning (Odeyemi, 1996). The incessant scarcity of petroleum products, epileptic supply of electricity, bad roads, flooding, and so on points to the fact that this country seriously needs to embrace and appreciate technology education. The resultant effects of Nigeria's state of technological development are being felt in other sectors of our economy uch as the agricultural sector, industrial sector, building and construction,

health and infrastructural sector – water, road, telecommunication and electricity. The bite is much felt due to lack of the necessary technical know-how to maintain the existing infrastructure and fabricate spare parts to maintain the heavy duty and medium size plants. Moreover, the frequent stealing and vandalization of Power Holding Company of Nigeria's (PHCN) equipment for example is traceable to the inability to produce them locally. Obviously, there will be no market for the stolen ones if the country is able to produce in large quantities.

As Oguntoye (2004) comments: There is no doubt that Nigeria has made tremendous leaps forward in educational development, especially with regard to quantitative expansion, are probably more than those we faced before the Ashby Commission of 1960. The physical structures may be available (they are in short supply). The problem is not that people are unwilling to send their kids to school, may not be the curriculum, may not even be quantity of trained personnel, but the critical problem is attitudinal, wrong value-orientation, wanting to cut corners, acquiring the certificates without acquiring knowledge, skills and competencies (pg. – 8). It becomes important to say here that if Nigeria as a nation is to be a developed and modern nation, it needs to be rational. A rational society is one which regards people as having the knowledge and ability to control their own destinies. Controlling one's destiny without depending on other countries for one's basic needs is self-reliance, a supposed target or goal of technology education.

Consequently, the focus now should be acquisition of thorough knowledge, skills, competencies and know-how capable of transforming and encouraging

people to develop openness to new experience, readiness to social change, placing higher value on technology education and aspiring to high levels of industrial attainment, understanding the logic underlying production and industry; placing high value on technical skill and accepting it as a basis for the distribution of rewards, and a basic trust in the calculating of the surrounding world, and that people and institutions can be relied upon to meet their obligations.

Conclusion

Attaining national development depends on three things that are considered most important. One is that education, particularly technology education which is the source of high levels of human capital accumulation, should be heavily invested in to generate the human resources Nigeria needs as the ' engine' for growth. There should be active government involvement or intervention that will encourage enormous investments in human capital, educating large skilled manpower able to absorb and adapt the most advanced technology.

Secondly, Nigerians should know that modern societies are science and technology driven. There is no reason why we cannot set target year for achieving technology education for all. Such focus will make Nigerians think scientifically and technologically, the resultant effects of which will be change in our attitude and belief system, worthwhile social, economic, political and cultural lives, culminating into poverty alleviation, economic progress that will touch millions of Nigerians.

Thirdly, irrespective of the level of education, the students are the core input into our educational institutions and the quality of the output (students) depends largely on the provision of infrastructures capable of directly or indirectly supporting, facilitating, influencing and encouraging the development of their potentials. Therefore, the knowledge, skills, competences and attitudes students acquire for life can make them fit into the cultural, social, economic and political contexts of the society in which they live, and to work and employment.

It can all be summarily put that quality of education is reflected in the fit between, on the one hand, the expectations of society expressed in the general and specific objective of education, and on the other, the actual characteristics of the educational process (technology education) and the changes observed at the students' level.

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